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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/058,100	01/29/2002	Masahiro Kihara	360842008300	1199

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EXAMINER	
MENON, KRISHNAN S	

ART UNIT	PAPER NUMBER
1723	

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/058,100	KIHARA ET AL.	
	Examiner	Art Unit	
	Krishnan S Menon	1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25 and 27-31* is/are pending in the application.

4a) Of the above claim(s) *18-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 27-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claims 1-25 and 27-31 are pending, of which claims 18-25 are withdrawn, after the amendment of 12/3/04

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

1. Claims 1,2 and 27-31 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Uhlinger (US 4,341,629).

Claim 1. Uhlinger teaches a method of desalinating water in a plurality of stages comprising membrane module units, wherein permeate water from a first stage membrane module unit is supplied to a second stage membrane module unit to obtain desalinated water therefrom, the method comprising (abstract, figures, col 4 lines 1-12):

processing at least a portion of a feed water having a total salt concentration of 3.0 to 4.8% by weight and a calcium ion concentration of 200 to 500 mg/l (sea water – col 3 line 46), wherein said at least a portion of the feed water is treated with the first stage membrane module unit (12-fig 1) to obtain the permeate water (figure 1 line 44) said permeate water being optionally mixed with an additional portion of the feed water to produce a second stage intake water (fig 1 line 22), and supplying the second stage intake water to the second stage membrane module unit

(14-fig 1), thereby obtaining the desalinated water (at 70 fig 1). Uhlinger does not limit the second stage intake water as having a total salt concentration of about 55 to 77% of that of the feed water and a calcium ion concentration of about 95% or less of that of the feed water. However, this would be inherent, because the process as taught by Uhlinger and the apparatus allow any proportion of mixing feed and first stage permeate, as seen in figure 1, abstract and col 1 line 52 – col 2 line 12. Since the first stage membrane has a salt rejection of 80%, the first stage permeate will have only 20% of the salinity of the feed, and therefore, it is possible to achieve the 55-77% salinity in the second stage feed by proportionately mixing the first stage permeate and feed streams. Under the principles of inherency, if a prior art device, in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986)

Claims 27, 28, 29: the added limitation "second stage intake having total salt concentration within limit such that substantially no scales form on a membrane of the second stage": this would be inherent in the Uhlinger process as discussed in claim 1 above. Reference teaches same process as claimed in claim 1; therefore, if applicant can prevent scaling by mixing first stage permeate with feed, so could the reference, even though the reference does not specifically say so (in re King). Independent Claim 28 has all the limitations of claims 1 and 27. Claim 29, depending from claim 1 recites

optionally mixing additional portion of feed water with first stage permeate – taught by Uhlinger as explained in claim 1 above.

Claim 2: A method according to Claim 1, wherein the feed water has a sulphate ion concentration of 1500 to 3500 mg/l (feed in ref is sea water) and the sulphate concentration is adjusted to 80% or less of that of the feed water by the first step (80% rejection by the first stage membrane would achieve this – see col 1line 55.

Claims 30 and 31: These independent claims differ from claim 1 by further defining the first stage membranes as "nano-filtration" (NF) and second stage as "reverse osmosis" (RO). In claim 31, there is also the additional element having a provision for 'optionally' mixing the first stage permeate with additional feed by a wherein clause, which then in both claims 30 and 31 is further limited to mixing at least a portion of the first stage permeate with additional portion of feed by another wherein clause. Uhlinger teaches these elements as well. Uhlinger teaches the nano-filtration and reverse osmosis membranes in col 4 lines 1-21. Of course, Uhlinger does not explicitly states "nano-filtration" membrane for the first stage, but it is implied because the membrane used is the 80%-seawater-rejecting membrane, which defines a nano-filtration membrane. For a definition of nano-filtration membrane, applicants' attention is drawn to Uhlinger (US 6,190,556 B1) col 8 lines 16-37, which defines nano-filtration membranes as the ones that reject divalent ions to >80% and monovalent ions to >60%. Mixing first stage permeate with fresh feed is taught in fig 1: see the lines 44 and 22, and the holding tank 20.

2. Claims 1,2, 11-13, 16,17 and 27-28 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by WO99/16714.

WO'714 teaches a method of desalinating water in a plurality of stages comprising membrane module units, wherein permeate water from a first stage membrane module unit is supplied to a second stage membrane module unit to obtain desalinated water therefrom, the method comprising (figures):

processing at least a portion of a feed water having a total salt concentration of 3.0 to 4.8% by weight and a calcium ion concentration of 200 to 500 mg/l (sea water – abstract), wherein said at least a portion of the feed water is treated with the first stage membrane module unit (figure 2 shows all of the feed water, which is 'at least a portion' of the total) to obtain the permeate water to produce a second stage intake water (fig 2), and supplying the second stage intake water to the second stage membrane module unit (figure 2), thereby obtaining the desalinated water (fig 2). WO'714 does not specifically limit the second stage intake water as having a total salt concentration of about 55 to 77% of that of the feed water and a calcium ion concentration of about 95% or less of that of the feed water. However, this would be inherent, because the process as taught by WO'714 would have feed concentration to the second stage in that range – see table 3, which gives the NF membrane output. Under the principles of inherency, if a prior art device, in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will

inherently perform the claimed process. In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986)

Claims 27, 28: the added limitation "second stage intake having total salt concentration within limit such that substantially no scales form on a membrane of the second stage": fig 2 and pages 3-6. Independent Claim 28 has all the limitations of claims 1 and 27.

Claim 2: A method according to Claim 1, wherein the feed water has a sulphate ion concentration of 1500 to 3500 mg/l (feed in ref is sea water) and the sulphate concentration is adjusted to 80% or less of that of the feed water by the first step (table 3).

Claims 11-13: first stage is nanofiltration – see fig 2; first sub-stage concentrate is fed to second sub-stage as in claims 12 and 13 – see figure 2.

Claims 16,17: scale prevention agent injected and pre-filtration with UF or microfiltration– pages 3-5

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 3-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uhlinger'629.

Uhlinger teaches all the limitations of claim 1, but does not specify the proportion of feed water treated in the first stage and then mixed with untreated feed for the second stage as in claim 3-5. However, this would be a variable that one of ordinary skill in the art could optimize to reduce the second stage permeate salinity and reduce the overall cost, depending on the condition of the feed and the process flow rates required. Uhlinger does not specify the %recovery of permeate water in the first stage from the feed water (amount of permeate expressed as % of water supplied) as in claims 6-9, and % permeate recovered from the second stage as in claim 10. However, these could be optimized by one of ordinary skill in the art to reduce the overall process cost and improve product quality; the maximum recovery being obtained by material balance.

2. Claims 11-13, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uhlinger'629 in view of WO 99/16714

Uhlinger teaches all the limitations of claim 1.

Claim 11 adds the further limitation of having a nanofiltration membrane in the first stage, which Uhlinger does not specifically teach. WO'714 teaches using nanofiltration membranes in the first stage in a multi-stage process (see figures and pages 4-6, summary of invention). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of WO'714 in the teaching of Uhlinger to reduce the hardness of the feed water in the first stage to reduce fouling in the second stage and improve the fresh water yield significantly, as taught by WO;714.

Claim 12: Uhlinger does not teach the first stage nanofiltration as having at least first and second membrane components, with concentrate from first membrane going to second membrane. Uhlinger teaches this – see figures of WO'714. It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of WO'714 in the teaching of Uhlinger to have plurality of membranes in series to increase production as taught by WO'714.

Claim 13: Uhlinger does not teach but WO'714 teaches second stage RO as having at least first and second membranes, with concentrate from first membrane being supplied to the second membrane – see WO'714 figures. It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of WO'714 in the teaching of Uhlinger to have plurality of membranes in series to increase production as taught by WO'714.

Claim 16 – scale prevention agent – see Uhlinger col 4 lines 22-32.

Claim 17: feed water is filtered with microfiltration or ultrafiltration membrane: Uhlinger does not specify what kind of pre-filter is used, WO'714 teaches pre-filtering with UF or MF etc – see pages 3 and 4. It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of WO'714 in the teaching of Uhlinger because Uhlinger does not specify the pre-filters needed.

3. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uhlinger'629 in view of WO 99/16714 as applied to claim 13 above and further in view of EP 0 709 130 A1

Claim 14. A method according to Claim 13, wherein the pressure of concentrate water from the first sub-stage reverse osmosis membrane module component is boosted and the concentrate water then supplied to the second sub-stage reverse osmosis membrane module component to obtain desalinated water.

Claim 15. A method according to Claim 14, wherein, in a plurality of sub-stages at which reverse osmosis membrane module components are disposed, the relation between the operating pressure P(n) of the first sub-stage reverse osmosis membrane module component and the operating pressure (Pn + 1) of the second sub-stage reverse osmosis membrane module component is in a range given by the expression

$1.15 \leq P(n + 1) / P(n) \leq 1.8$.

Uhlinger in view of WO'714 does not teach a booster pump as in claim 14 or the expression as in claim 15. EP teaches a booster pump in a multistage RO (Fig 1) and the expression (see claim 13 of EP). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of EP'130 in the teaching of Uhlinger in view of WO'714 to boost the pressure of concentrate to the second sub-stage because it will provide the pressure and recovery optimization as taught by EP'130 (abstract)

4. Claims 3-5, 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO'714 in view of WO 01/14256.

WO'714 teaches all the limitations of claim 1, but does not specify the proportion of feed water treated in the first stage and then mixed with untreated feed for the second stage as in claim 3-5. WO'256 teaches mixing part of the feed with permeate

from first stage – see figure 1,2 and table 7. It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of WO'256 in the teaching of WO'714 because WO'256 is an improvement over WO'714 ((page 7 lines 1-14).

Claim 29, depending from claim 1 recites optionally mixing additional portion of feed water with first stage permeate – taught by WO'265.

Claims 30 and 31: These independent claims differ from claim 1 by further defining the first stage membranes as "nano-filtration" (NF) and second stage as "reverse osmosis" (RO). In claim 31, there is also the additional element having a provision for 'optionally' mixing the first stage permeate with additional feed by a wherein clause, which then is further limited in both claims 30 and 31 to mixing at least a portion of the first stage permeate with additional portion of feed by another wherein clause. WO'714 does not teach mixing a portion of the feed with the first stage permeate, but WO'256 does, as explained in claim 29.

5. Claims 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO'714.

WO'714 teaches all the limitations of claim 1. Instant claims add further limitations about which WO is silent, as follows:

Claims 6 and 7 recites the recovery (amount of permeate expressed as % of total water supplied) of the permeate from the first stage. This is a result effective variable depending on the process flow rate required and the cost of operations, and it would be obvious to one of ordinary skill in the art at the time of invention that the NF

recovery could be optimized. Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. In re Boesch and Slaney, 205 USPQ 215 (CCPA 1980); In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977); In re Aller, 42 CCPA 824, 220 F.2d 454, 105 USPQ 233 (1955).

Similarly, claims 8-10 recites recovery from the RO plant in different ways (overall recovery), which is also a result effective variable and within the skill of one of ordinary skill in the art (In re Boesch and Slaney...)

6. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO'714 in view of WO 256 as applied to claim 13 above and further in view of EP 0 709 130 A1

WO'714 in view of WO'256 does not teach a booster pump as in claim 14 or the expression as in claim 15. EP teaches a booster pump in a multistage RO (Fig 1) and the expression (see claim 13 of EP). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of EP'130 in the teaching of WO'714 in view of WO'256 to boost the pressure of concentrate to the second sub-stage because it will provide the pressure optimization as taught by WO'256 (page 7 lines 12-14)

Response to Arguments

Applicant's arguments filed 12/3/04 have been fully considered but they are not persuasive.

(1) In response to the argument re "being optionally mixed" vs "being mixed": Claim 29 is rejected as anticipated by Uhlinger, and as being obvious over WO'714 in view of WO'256. To keep the record straight, the examiner has rejected claim 29 with the fullest consideration that claim 29 recited "being optionally mixed", and not as "being mixed". Claim 29 was not considered as anticipated by WO'714 because of this recitation. WO'714 was not deemed to have the *'option' to mix the first stage permeate with additional feed* to anticipate "being optionally mixed".

(2) In response to applicant's arguments about the inherency rejection: Applicants make a very strong, albeit unnecessary, comment, "*As everyone knows, it is impossible to prove or disprove something that does not exist.*" [Italics in original]. Re the question of whether the references inherently teach "total salt concentration of about 55 to 77% of the feed", sufficient information such as figures, tables and paragraphs in the reference were given, which one of ordinary skill in the art would use to decipher the inherency. If one may put in the rejection values of the first stage module at 80% for Uhlinger, one would see that the first stage permeate is at about 80% of that of the feed. First stage permeate is shown as being mixed with the feed through line 44, tank 20 and line 22 to the suction side of the feed pump 10. The line has control valves. Therefore, the concentration of the feed at the pump discharge could be controlled to between 55 – 77% of the feed, if one needs to do so, by the Uhlinger system. Uhlinger system is capable of doing it, and therefore, by In re King doctrine, Uhlinger apparatus is capable of inherently performing the process claimed.

Similarly, in the case of WO'714, the salt concentration of the first stage permeate is given in table 3 of the reference, which falls at about 63%. The calcium ion concentration need be only 95% or less of that of the feed water, and in both references this can be seen as significantly lower than 95%.

(3) In response to the argument that 'improvement over the prior WO'714' was too general a motivation to combine, the strongest rationale for combining references is a recognition, expressly or impliedly in the prior art or drawn from a convincing line of reasoning based on established scientific principles or legal precedent, that some advantage or expected beneficial result would have been produced by their combination. In re Sernaker, 702 F.2d 989, 994-95, 217 USPQ 1, 5-6 (Fed. Cir. 1983). As stated in the rejection, page 7 lines 1-14 of the WO'256 reference clearly states such advantages, especially the advantage of "...introduction of a feed of variable proportions of softened and untreated salt water to a desalination system ... to increase the yield of potable water".

(4) In response to applicants' argument that ***examiner has taken official notice without providing any evidence to support inherency*** [emphasis added]: there is no basis to this allegation. Applicant seems to have simply not paid sufficient attention to the specifics given in the rejection such as where to find the inherent information in the references. [If it may be of any help, please note that the WO'256 ref does not explicitly or inherently teach the 55-77% salt concentration for the second stage feed (after mixing the first stage permeate and more feed), because this reference uses a nanofiltration membrane that rejects monovalent salts poorly (table 7; their emphasis on

the first stage is on preventing fouling by scaling, which is caused by calcium ions). WO'714 and Uhlinger, on the other hand, has the first stage (nanofiltration) membrane rejecting the monovalent ions (like sodium and chloride) at significantly higher percentage to have the <77% first stage permeate concentration.]

Conclusion

This is a second action after an RCE. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S Menon whose telephone number is 571-272-1143. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L Walker can be reached on 571-272-1151. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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